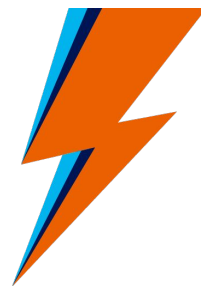




Weave Ignite

The GitOps VM



About me

- Happily married 29 years
- 2 fantastic children
- Avid runner, biker, horror movie viewer
- Member SIG Cluster Lifecycle
- Weaveworks development manager
- Previous to Weaveworks I was the founder of [Yipee.io](https://yipee.io)
- Twitter: [@markemeis](https://twitter.com/markemeis)
- Github: [palemtnrider](https://github.com/palemtnrider)
- LinkedIn: [mark-emeis](https://www.linkedin.com/in/mark-emeis)



Weaveworks is an open source leader in cloud native

Kubernetes

We led the creation of the flagship Kubernetes installer Kubeadm

We created eksctl – the [official EKS CLI](#) enabling GitOps on AWS

Weave Net - the original container SDN & Firewall

LibCNI Kubernetes network model - work with CoreOS (now RH/IBM)

[Weave Ignite](#) - the container VM for secure, fast Kubernetes anywhere



Observability

We made Prometheus scalable with Weave Cortex & launched 1st Prom-aaS, powering EA's global games. Cortex is a CNCF project now.

Weave Scope is one of the ["top tools for monitoring Kubernetes"](#) providing management and monitoring and visualization for <20,000 users



CD and GitOps tooling

CNCF Flux is a Kubernetes-native CD tool for GitOps - also Flux-Helm.

Weave Flagger for progressive delivery

JKcfg for templating, policy and actions

Kubediff - diff alerting for Kubernetes to enable GitOps

Kured - Cluster Reboot Tool

Grafanalib - GitOps dashboarding for Grafana



Integrations

Weaveworks for: Istio, Kubeflow, OpenFaaS, Cloud Foundry



Weave Ignite

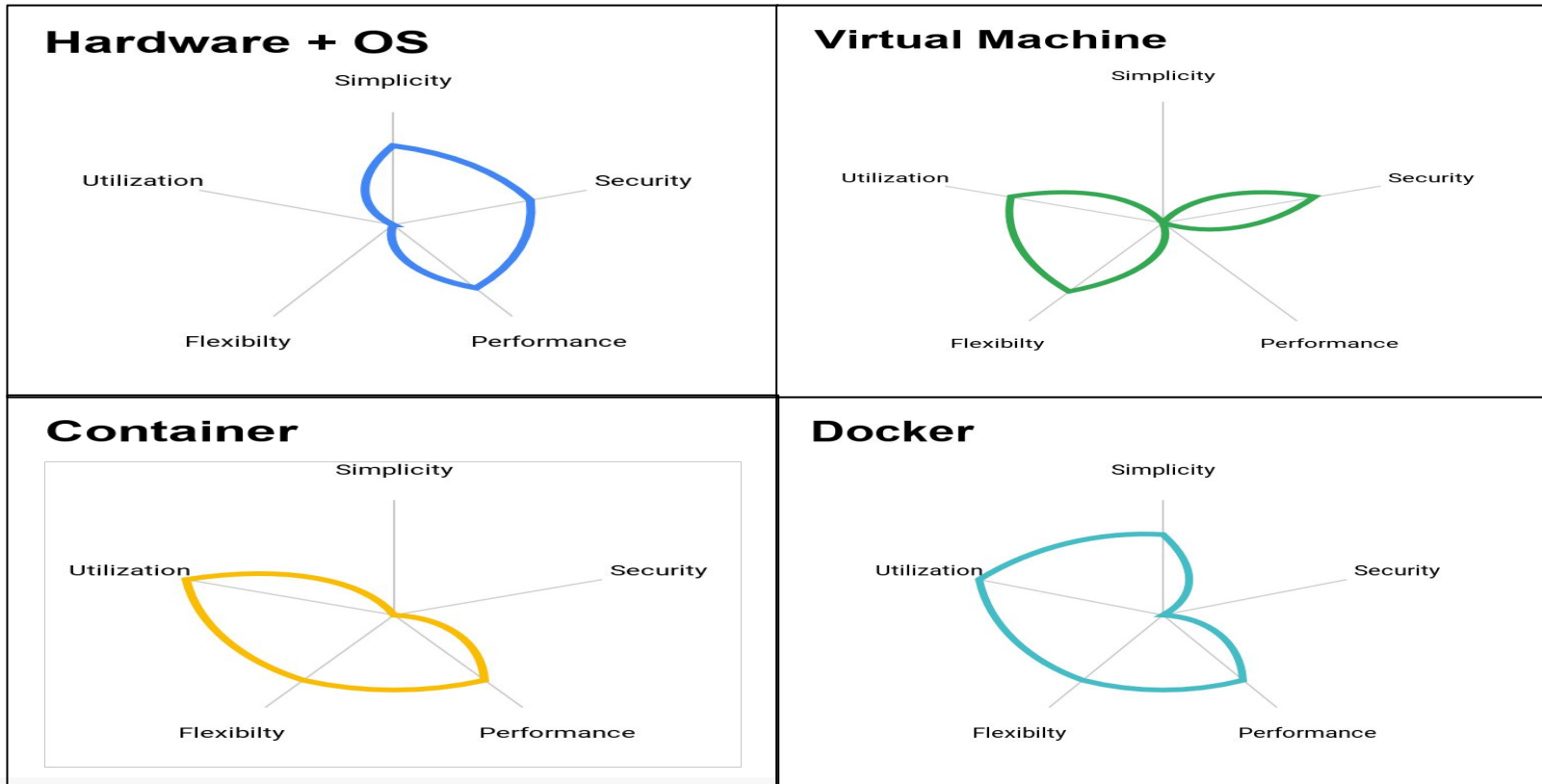
An open source virtual machine manager, leveraging the UX of Docker, container building blocks, with built-in GitOps created by a VM-agnostic company



Firecracker

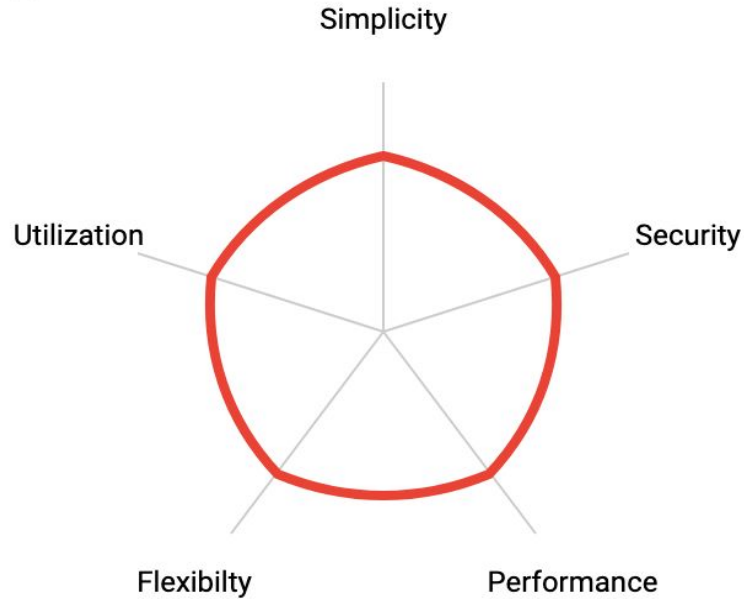


VM Lineage



VM Lineage

Ignite





Weave Ignite CLI

```
Usage:
ignite [command]

Available Commands:
attach      Attach to a running VM
completion Output bash completion for ignite to stdout
create      Create a new VM without starting it
exec        execute a command in a running VM
help        Help about any command
image       Manage base images for VMs
inspect     Inspect an Ignite Object
kernel      Manage VM kernels
kill        Kill running VMs
logs        Get the logs for a running VM
ps          List running VMs
rm          Remove VMs
rmi         Remove VM base images
rmk         Remove kernels
run         Create a new VM and start it
ssh         SSH into a running vm
start       Start a VM
stop        Stop running VMs
version     Print the version of ignite
vm          Manage VMs
```



Motivation

- Open source VM and VMM solution
- Declarative control
- Limited access to cloud resources
- Lightning fast testing turnaround time
- Docker in Docker limitations
- Non-functional requirements testing
- Embracing container management
 - Disposable infrastructure
 - Immutable infrastructure
 - Container runtime
 - CNI benefits
- VM Pet mentality
 - VM Performance
 - VM Size
 - VM Cost
 - VM effort to create



System Requirements

- Kernel 4.14 or newer
- Ipv4 forwarding `sysctl net.ipv4.ip_forward=1`
- Kernel loop module `modprobe -v loop`
- CPU Virtualization (Intel VT-x, AMD AMD-V) ARM work in progress
- Containerd, Docker, CNI, git, openssh-client, dmsetup, binutils
- KVM
- Ignite, ignited

More details at <https://ignite.readthedocs.io/en/stable/dependencies.html>



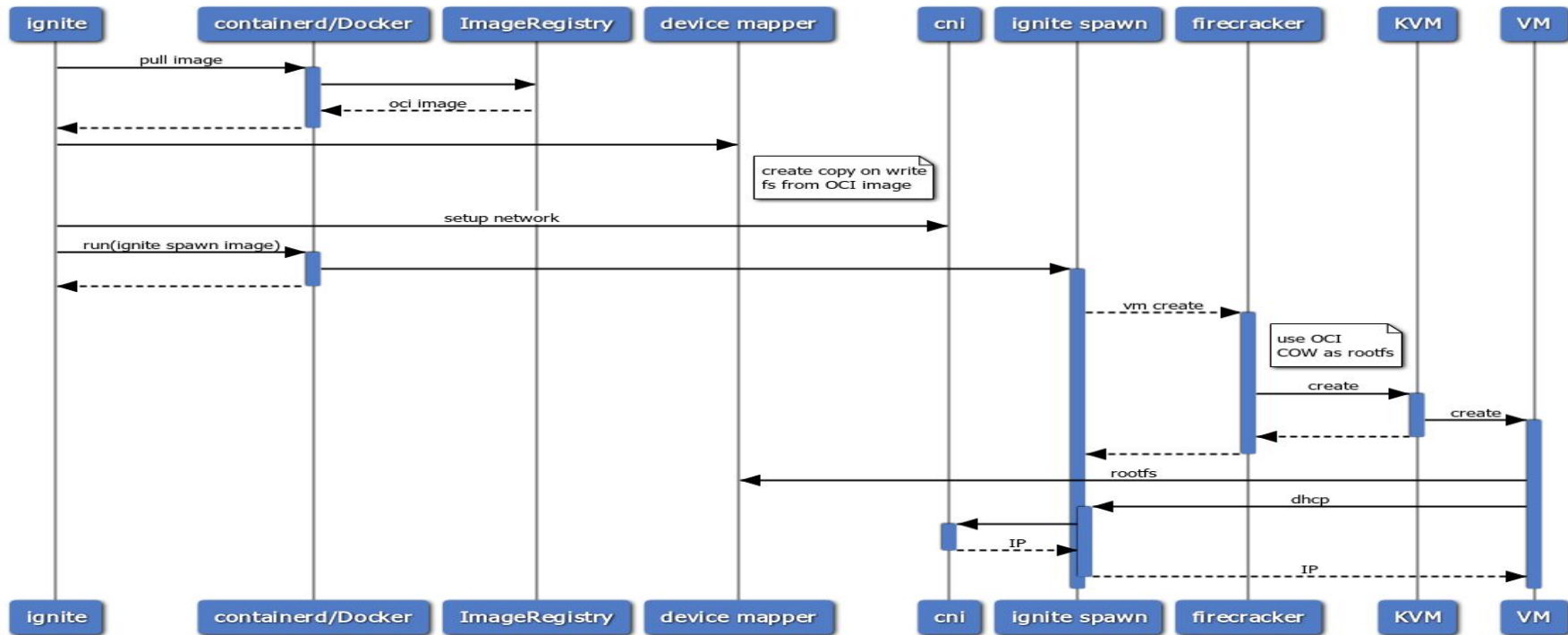
DEMO

Creating VMs



Ignite run

Ignite run

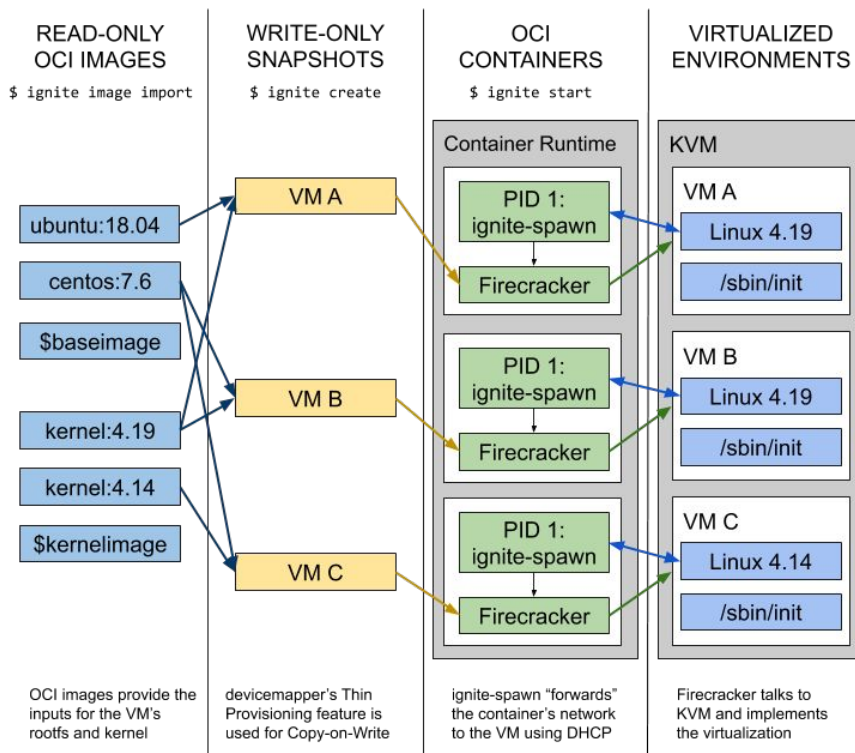


Architecture

Use OCI for:

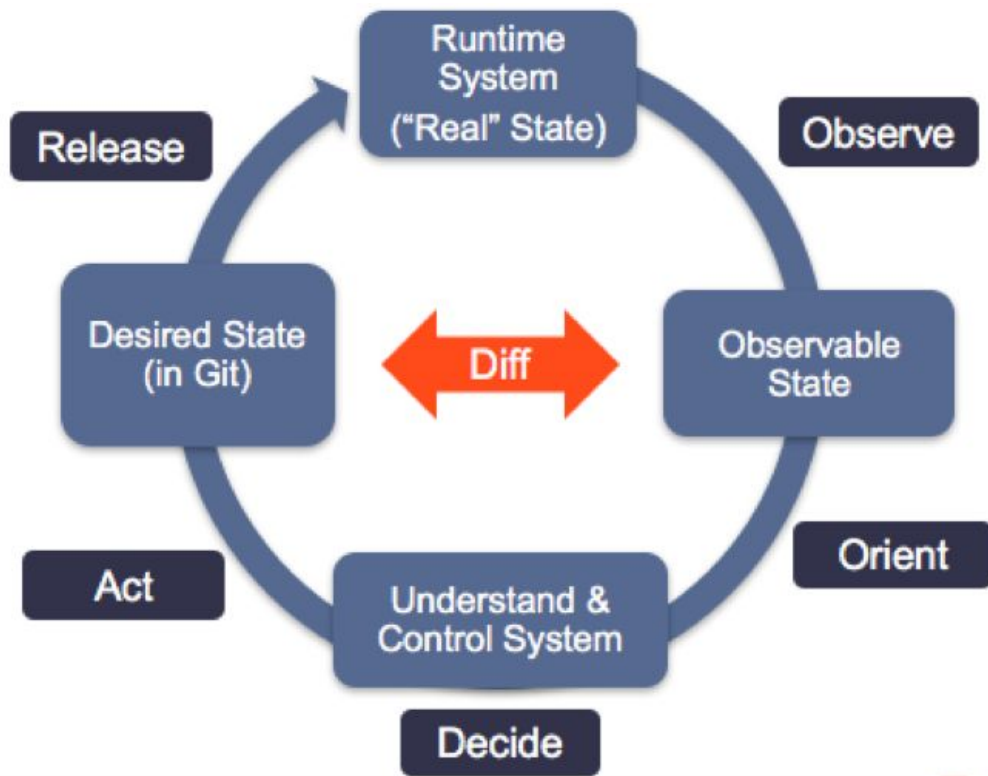
- content distribution
- monitoring processes
- process isolation

Device Mapper & DHCP bridges
containers + VMs



GitOps

- Loose coupling of what and how
- Starting from a single source of record - Git
- Reconciliation loop integral
 - Desired => Actual state
- Common tooling across disciplines Dev & Ops



Weave Ignite manifest

```
apiVersion: ignite.weave.works/v1alpha2
kind: VM
metadata:
  created: "2019-11-10T00:23:22Z"
  name: falling-wildflower
  uid: ca096c69c5dd1f81
spec:
  cpus: 1
  diskSize: 4GB
  image:
    oci: weaveworks/ignite-ubuntu:latest
  kernel:
    cmdline: console=ttyS0 reboot=k panic=1 pci=off ip=dhcp
    oci: weaveworks/ignite-kernel:4.19.47
  memory: 512MB
  network: {}
  storage: {}
status:
  image:
    id: oci://docker.io/weaveworks/ignite-ubuntu@sha256:f8032a6738fdb372eb7e64734c9481f
    size: 237539766B
  ipAddresses:
    - 172.17.0.3
  kernel:
    id: oci://docker.io/weaveworks/ignite-kernel@sha256:a189f75c73a69ca4ab65a08a6566032
    size: 52021449B
  running: true
  runtime:
    id: 83980f5af6952f5921fc9024fb3a759b6e4db28177faf3ca34a229d764eabcd3
  startTime: "2019-11-10T00:23:22Z"
```



DEMO

Ignite GitOps



Building VMs (new way)

```
FROM luxas/kernel-builder:gcc-7 AS builder
ARG KERNEL_VERSION
ARG KERNEL_EXTRA
RUN git fetch --tags
RUN git checkout v${KERNEL_VERSION} && \
    make clean && make mrproper

COPY config-${KERNEL_VERSION}${KERNEL_EXTRA} .config

RUN make EXTRAVERSION=${KERNEL_EXTRA} LOCALVERSION= olddefconfig && \
    make EXTRAVERSION=${KERNEL_EXTRA} LOCALVERSION= olddefconfig

RUN make EXTRAVERSION=${KERNEL_EXTRA} LOCALVERSION= -j32
RUN make EXTRAVERSION=${KERNEL_EXTRA} LOCALVERSION= modules_install

RUN cp vmlinux /boot/vmlinux-${KERNEL_VERSION}${KERNEL_EXTRA} && \
    ln -s /boot/vmlinux-${KERNEL_VERSION}${KERNEL_EXTRA} /boot/vmlinux && \
    cp .config /boot/config-${KERNEL_VERSION}${KERNEL_EXTRA}

FROM scratch
COPY --from=builder /boot /boot
COPY --from=builder /lib/modules /lib/modules
```

```
ARG RELEASE

FROM ubuntu:${RELEASE}

# udev is needed for booting a "real" VM, setting up the ttyS0 console properly
# kmod is needed for modprobing modules
# systemd is needed for running as PID 1 as /sbin/init
# Also, other utilities are installed
RUN apt-get update && apt-get install -y \
    curl \
    dbus \
    kmod \
    iproute2 \
    iputils-ping \
    net-tools \
    openssh-server \
    sudo \
    systemd \
    udev \
    vim-tiny \
    wget && \
    apt-get clean && \
    rm -rf /var/lib/apt/lists/*

# Create the following files, but unset them
RUN echo "" > /etc/machine-id && echo "" > /var/lib/dbus/machine-id

# This container image doesn't have locales installed. Disable forwarding the
# user locale env variables or we get warnings such as:
# bash: warning: setlocale: LC_ALL: cannot change locale
RUN sed -i -e 's/^AcceptEnv LANG LC_*/##AcceptEnv LANG LC_*/' /etc/ssh/sshd_config

# Set the root password to root when logging in through the VM's ttyS0 console
RUN echo "root:root" | chpasswd
```



DEMO

Prometheus data



Git involved

- Kubernetes distributions on Ignite.
 - Rancher K3s (<https://k3s.io/>)
 - Openshift
 - Kind...
- Tooling around Serverless and FaaS
- Ignite library
- File system enhancements
- Weave Ignite <https://github.com/weaveworks/ignite>
- GitOps toolkit <https://github.com/weaveworks/gitops-toolkit>
- Firecracker <https://firecracker-microvm.github.io/>
- Footloose (docker-compose) <https://github.com/weaveworks/footloose>
- Firekube - Weave Kubernetes Quickstart leveraging Footloose / Ignite <https://github.com/weaveworks/wks-quickstart-firekube/>



Next steps

Visit our booth (**#S51**) to meet the team, grab some swag and learn more about **Ignite and automating Kubernetes with GitOps!**

Try our GitOps Hands-On for a prize!

www.weave.works



Q&A

